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NATIONAL SPACE POLICY

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NATIONAL SPACE POLICY

THE POLICY of the United States on exploration of outer space has been the target of more widespread criticism in the past few months than at any time since the Soviet Union sent Sputniks I and II circling the earth more than two years ago. Much of the criticism has come from newspapers and magazines which do not make a practice of criticizing policies of the Eisenhower administration, from respected members of Congress, and from scientists and engineers who direct space research programs. Explicit or implicit in nearly all of the unfavorable comment has been mounting anxiety over the failure of this country to go all out in an effort to overcome Russia's head start in space exploration.

The United States has probably pulled even with Russia in development of reliable long-range military missiles.[1] As for rockets for which no pressing military need is currently apparent, it was common until recently to say: "They're ahead in propulsion; we're ahead in instrumentation." Then Russia hit the moon with Lunik II, launched Sept. 12, and photographed the far side of the moon with Lunik III, launched Oct. 4. In light of these feats, particularly the latter, it is now feared that doubts about the precision and sophistication of Soviet instrumentation were products of wishful thinking. Indeed, some American scientists believe U.S. progress in propulsion has not been as great in the past two years as Soviet progress in instrumentation. This raises the possibility that since Sputnik I the gap between the United States and Russia in the space race has widened rather than narrowed.

Attacks on the American Record and Policy

This country's space program has been criticized on many counts. Commenting on the performance of Lunik

[1] Former Defense Secretary Neil H. McElroy said at a news conference on Dec. 1, the day he resigned, that each country had about 10 combat-ready intercontinental ballistic missiles. He added that by 1963 the Soviet Union might well have moved ahead in I.C.B.M.'s because this country planned to limit its investment in first-generation Atlas missiles and concentrate on developing the solid-fuel Minuteman, which is not scheduled to become operational until 1963.

III, Donald H. Menzel, director of the Harvard Observatory, called the photographic venture "a remarkable scientific achievement." He asserted that indifference and indecision had kept the United States from recording a similar achievement, and that the Department of Defense had "tried to degrade the importance of research and put balancing of the budget ahead of any attempts for research."

Senate Majority Leader Lyndon B. Johnson (D Texas) said, Oct. 11, that "We ought to spend the money, the time and the effort needed to surpass the Russian effort." Johnson ordered a preliminary inquiry into the space program, which, he said, seemed to lack "coordinated authority" and "a driver." He is chairman of the Senate Committee on Aeronautical and Space Sciences. Rep. Overton Brooks (D La.), chairman of the House Committee on Science and Astronautics, announced on Oct. 28 that his group would open extensive hearings in January to determine why the United States was lagging in space exploration. Brooks said on Dec. 1 that the Thanksgiving Day failure to put an American satellite into orbit around the moon had convinced him that the United States should undertake a crash program "to overcome the Russian lead before it is too late." He estimated the cost of such a program at "roughly $1.5 billion to $2 billion a year."

Sen. Stuart Symington (D Mo.) asserted on Nov. 5 that the United States was "doing a second-rate, second-best job" in missile and space development chiefly because the Eisenhower administration "not only has failed to establish a single organization to do the job, but hasn't even decided whether the job should be done." On the same day, Sen. Richard B. Russell (D Ga.), chairman of the Senate Armed Services Committee, put primary blame on the President for having failed to give the space program "the priority it should have." Russell said also that absence of "inspired leadership" from the White House was the major reason for public apathy toward space policy.

Maj. Gen. John B. Medaris, commander of the Army Ballistic Missile Agency, said on Oct. 29 that he would like to see this country engage in a genuine space race with Russia, but that the problem was "to find out whether the public is interested in racing." [2]

[2] Medaris insisted on Oct. 20 that his impending retirement was "not a matter of protest or personal dissatisfaction." He was commenting on the statement of his chief scientist, Wernher von Braun, that "If Gen. Medaris had been given a very challenging program, he might have delayed his retirement."

COMPARISON OF SOVIET AND U.S. ACHIEVEMENTS

The Soviets have demonstrated superiority in outer space by a series of significant "firsts." Sputnik I, launched Oct. 4, 1957, became the first artificial earth satellite. Sputnik II, sent up Nov. 3, 1957, was the first satellite to carry a living creature into orbit—the dog "Laika." Sputnik III, launched May 15, 1958, was the first satellite to have a net weight of more than one ton.[3]

Lunik I, fired Jan. 2, 1959, was the first space vehicle with sufficient propulsion to escape the earth's gravitational field and pass on to orbit the sun. With Lunik II, shot from the earth last Sept. 12, Russia gained the honor of placing the first man-made object, complete with hammer-and-sickle emblems, on the moon. Most recently, on Oct. 4, the Soviet Union became the first country to put a payload into a vast orbit around both moon and earth and in the process take pictures of regions of the moon never in direct line of man's vision. There is no telling how many space failures the Soviets have suffered, but they have had good luck calling some of their shots. They ushered in the year 1959 with Lunik I, heralded Premier Khrushchev's American tour with Lunik II, and rang in the third year of the space age with Lunik III.

More than half of this country's space launchings have been unsuccessful.[4] However, the United States has put more than a dozen satellites into orbit—mainly Explorers, Vanguards, and Discoverers—and has probed deeply into space with a series of Pioneer rockets. T. Keith Glennan, administrator of the National Space and Aeronautics Administration, nevertheless said last August: "We have learned that we are not nearly as far advanced in space technology as we had thought or hoped. . . . We should admit, quite frankly, that with distressingly few exceptions we have not achieved complete success in any mission to date."

Although direct comparisons cannot be made with accuracy, the United States in a sense has matched the Soviet Union in two of the feats achieved by the three Sputniks

[3] Moscow reported that Sputnik III's instrument capsule weighed 2,925 pounds; the instruments alone, 2,134 pounds. Gross weight orbited in the Sputnik shots never has been divulged. Estimates for Sputnik III put combined weight of payload and final rocket stage at anywhere from 7,000 to 14,000 pounds.

[4] Mainly because—in terms of total number of launchings attempted—only three of 11 Vanguard satellites went into orbit.

and the three Luniks. Pioneer IV, launched on March 3, 1959, went into orbit around the sun as had Lunik I two months earlier. Five of the six Discoverer satellites orbited by the Air Force in 1959 carried bigger payloads than did Sputnik I. But these comparisons do not tell the full story. Russia put 3,245 pounds, including a 796-pound instrument capsule, into solar orbit, whereas the American sun-circling satellite weighs only 13.4 pounds. The instrument capsule aboard recent Discoverer satellites weighed more than 300 pounds, compared to Sputnik I's 184-pound capsule. On the other hand, the gross weight orbited by the Russians in launching their first satellite—about four tons—was far more than the 1,700 pounds sent circling the globe in recent Discoverer launchings.[5]

U.S. Scientific Findings; Soviet Rocket Power

Well-publicized failures have tended to obscure the fact that the United States has to its credit in space exploration some solid scientific findings that surpass any so far reported by the Soviet Union. Robert Jastrow, chief of NASA's Theoretical Division and chairman of its Lunar Science Group, wrote recently: "It can be reasonably stated that we have obtained more fundamental scientific information from our satellites than the U.S.S.R. from its instruments, and on a per pound basis our yield of information has been amazing." Jastrow put particular stress on two findings. Information supplied by instruments placed in the first American satellite, Explorer I, by James A. Van Allen led to discovery of what is now called the "Van Allen radiation belt." This vast layer of energized particles, according to Jastrow, "may provide the explanation for the aurora" and "will also influence the design of vehicles for manned space flight, whose occupants must be shielded against their harmful biological effects."[6]

A second important finding from American space exploration is that the earth is slightly pear-shaped, with its stem at the North Pole. This discovery was made with the aid of instruments included as a part of the 3.25-pound payload of Vanguard I, launched March 17, 1958. Jastrow has said that it "may produce major changes in our ideas on the interior structure of the earth."[7]

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[5] One technical failure or another has foiled six Air Force attempts to recover Discoverer instrument capsules.

[6] Instruments placed in Pioneer III, launched Dec. 7, 1958, enabled U.S. scientists to discover that farther out in space there is a second radiation belt.

[7] Robert Jastrow, "Van Allen Discovery Most Important," *Missiles and Rockets*, July 20, 1959, p. 49.

John W. Finney, space correspondent of the *New York Times*, pointed out on Oct. 11, however, that this country's "lead in scientific findings, while testimony to the ingenuity of American scientists and the incredible miniaturization techniques of their engineering colleagues, is at best a temporary one." This, Finney said, was because "in space, as in war, the victory inevitably goes to him who gets there firstest with the mostest." The controlling factor in space competition today remains what it was two years ago: the U.S.S.R. is far ahead of the United States in first-stage rocket power.

At this point in the space age, the first-stage rocket, or booster, is by far the most important part of a rocket combination, for it determines how heavy a payload can be sent aloft and how deeply into space it will penetrate. The booster rocket used for the first three successfully launched Explorer satellites was capable of about 83,000 pounds of thrust; that used for the three Vanguard satellites that went into orbit, 27,000 pounds. Take-off thrust of the rockets employed to orbit later Explorers, and Discoverers and Pioneers as well, has been about 150,000 pounds. The Russians, in contrast, had developed by 1957 a reliable rocket capable of an estimated 500,000 to 800,000 pounds of initial thrust. Moscow has disclosed that this mighty booster, known as T-3, was used to launch the three successful Soviet moon shots; presumably it also provided the take-off thrust for the Russian earth satellites—Sputniks I, II and III.

This country's Atlas intercontinental ballistic missile was not made combat-ready until this year. Its 360,000 pounds of initial thrust are adequate for a long-range missile. When combined with upper-stage rockets, the Atlas will be able to send bigger loads farther into space than other available boosters. However, the first space vehicle of this type—the three-stage Atlas-Able—failed on Nov. 26 to carry a 372-pound instrument capsule into lunar orbit. The United States cannot attempt the feat again in the near future unless an Atlas booster is diverted from some other military or civilian project that has already been labeled essential.[8]

[8] NASA Associate Administrator Richard E. Horner said on television, Nov. 29, that a number of Atlas-Able rockets were on order, and that "the possibility of changing the schedule of specific missions," in order to make a rocket booster available for another try, was under consideration. Horner said the Atlas had been "burning exactly as programmed" when premature splitting off of a plastic nose sheathing caused disintegration of the upper stages.

Development of U.S. Space Effort

AN AMERICAN civilian space agency—the National Aeronautics and Space Administration—was finally organized on Oct. 1, 1958, a full year after Sputnik I had been orbited and more than a decade after the Soviet Union had instituted its space program. Although Americans had been startled by the spectacular demonstrations of Soviet superiority in space, it took a long time to reach agreement on the significance of the Russian accomplishments and on any changes of policy that it would be advisable for this country to make.

Five days after the first Red satellite started to circle the earth, President Eisenhower told a news conference that the launching did "not raise my apprehensions one iota" so far as the country's security was concerned. He said the government had given priority to missile development and had considered the satellite program "merely an engagement on our part to put up a vehicle of this kind during the period" of the International Geophysical Year.[9] However, the President moved toward revision of the U.S. missile and satellite program on Nov. 7—four days after Sputnik II was launched—by naming James R. Killian Jr., president of the Massachusetts Institute of Technology, his special assistant for science and technology.

Congressional reaction to the orbiting Soviet satellites indicated greater concern. Four Senate and House subcommittees launched inquiries into the missile and satellite program. The investigation conducted by the Senate Armed Services Preparedness subcommittee was the most comprehensive; Sen. Johnson, chairman of that group, outlined its preliminary conclusions on Jan. 7, 1958. Criticizing the administration's downgrading of space projects, he declared that the "evaluation of the importance of control of outer space" by this country "has not been based primarily on the judgment of men most qualified to make such an appraisal." Johnson noted that the "sputniks now orbiting around the earth are not military weapons but have a military potential." [10]

[9] The I.G.Y. ran from July 1, 1957, through Dec. 31, 1958.

[10] The senator added: "Control of space means control of the world, far more certainly, far more totally, than any control that has ever or could ever be achieved by weapons or by troops of occupation."

Amid charges that missile and space activities of the military services showed both needless duplication and serious gaps, Secretary of Defense Neil H. McElroy on Feb. 7, 1958, announced establishment of an Advanced Research Projects Agency to coordinate space research within the Pentagon. Steps to coordinate space activities on Capitol Hill were taken about the same time; the Senate created a temporary committee, Feb. 10, to prepare recommendations on a space program, and the House did the same on March 5. Meanwhile, the question of whether American space projects should be placed under military or civilian control, or be divided between military and civilian agencies, was warmly debated.

The administration's proposals were set forth in a special message sent to Congress on April 2, 1958. President Eisenhower recommended creation of a new civilian agency to direct all of the country's space activities "except . . . those projects primarily associated with military requirements." The temporary space committees of both houses held hearings on the administration bill and other measures during the ensuing two months. Different versions of the administration bill, passed by House and Senate in June, yielded to compromise by mid-July, and the President signed the final bill on July 29.

New Space Act's Provisions; Creation of NASA

The National Aeronautics and Space Act of 1958 placed under the new National Aeronautics and Space Administration all space projects not determined by the President to be primarily associated with national defense; the latter were placed under Pentagon jurisdiction. Three separate bodies were created to help carry out the policies laid down and to help assure "preservation of the role of the United States as a leader in aeronautical and space science and technology."

First, a top policy-making council was established to counsel the President on major decisions on space questions. The President was directed, with the advice of the Space Council, to develop a comprehensive space program, to allocate responsibility for major projects, and to promote cooperation and provide for resolution of differences among departments and agencies.[11] Second, NASA was set

[11] The National Aeronautics and Space Council is composed of the President, the Secretaries of State and Defense, the heads of NASA and the Atomic Energy Commission, and four other appointees—three from private life.

up as the new civilian space agency. Finally, a Civilian-Military Liaison Committee was provided for to perform functions suggested by its name. It was hoped that the committee would be able to resolve differences between agencies at the working level.

The first big task facing NASA when it formally came into existence on Oct. 1, 1958, was organizational. The new agency absorbed the 8,000 employees and the facilities of the National Advisory Committee for Aeronautics, which had been in existence since 1915. T. Keith Glennan, named NASA administrator, described the nucleus group last May as "a little known but very important government agency" which "for 43 years . . . carried out its researches in comparative anonymity . . . and provided the fundamental information on which most of our progress in the aircraft field has been based."

NASA took on additional experts and built a small number of new research and testing facilities. In the main, however, the agency's expansion has come about through transfer to it of military teams and projects. It acquired the Vanguard team from the Navy, the Jet Propulsion Laboratory of the California Institute of Technology from the Army and, most recently, a substantial part of the Army's Ballistic Missile Agency at Huntsville, Ala., notably the Development Operations Division headed by Wernher von Braun. This 4,200-man group, led by 100 German scientists who were responsible for the World War II V-I and V-II rockets, developed the Jupiter-C rocket, which launched America's first satellite, and the Juno II, which put the free world's only sun satellite into orbit.

Shifting of the von Braun group to NASA involved not only the experts but also the project on which most of their attention had been focused of late—Project Saturn. This giant rocket cluster is to have twice the take-off thrust of any rocket the Soviets are known to have developed. Although President Eisenhower proposed the transfer on Oct. 21, it is not to take full effect until next spring.[12] NASA and the Department of Defense on Nov. 18 issued "a memorandum of understanding" on "the interim management of Project Saturn pending its formal transfer to NASA."

[12] The Space Act provides that such a transfer shall not become effective until (1) the President has justified it in a report to Congress and (2) Congress has had 60 days in regular session to disapprove the transfer by adoption of a concurrent resolution.

MAN-IN-SPACE AND OTHER EXPLORATION PROJECTS

A week after NASA won its year-long struggle to take over Saturn and the Huntsville group, Glennan outlined the "major components" of the country's space program.[13] One component is manned flight in outer space. Although it is taken for granted that manned space probes will assume infinite variety and purpose in years ahead, NASA is concentrating for the present on a modest but significant program—the well-publicized Project Mercury. An Atlas rocket will provide the initial thrust needed to put the 2,000-pound man-carrying capsule into orbit. Because of the complexities involved in building a completely reliable propulsion combination—not to mention the time required to train astronauts, to perfect safety and recovery techniques, and to set up adequate tracking facilities—the first American-manned satellite is not expected to be launched until 1962 at the earliest. About 15 per cent of the half-billion dollars allocated to NASA for the current fiscal year is being spent on this project.

Another 15 per cent of NASA's fiscal 1960 budget is being spent to develop instruments and satellites for scientific exploration of space. Some knowledge has already been gained—and still more will be acquired with steadily improving technology—about cosmic and solar rays, micrometeorites, space temperatures, magnetic fields, and many other features of space that are of great importance to scientists.

The importance of some of NASA's exploration projects, particularly those in the meteorological and communications fields, can be readily appreciated by the layman. Project Tiros, which will seek to place two cloud-scanning television cameras into orbit, will probably be test-launched in 1960.[14] Crude photographs taken on recent rocket flights have convinced the Weather Bureau that study of global cloud patterns would be of great assistance in spotting storms and gathering other information needed for earlier and more accurate weather forecasting. The Tiros program is considered a first step toward a system capable of producing a cloud map of the world every two hours.

Research in the communications field is still at an early

[13] In an address before the American Bankers Association, Oct. 28, 1959.

[14] One camera will photograph a large area; the other will pick up details. Images will be stored, then relayed to stations in Hawaii and New Jersey. If all goes well, film should be ready for scrutiny half an hour after the vehicle passes over the stations.

stage. NASA is planning to test next spring the feasibility of a "passive" reflector communications system. In Project Echo, announced Dec. 7, an attempt will be made to send an inflatable sphere of 100-foot diameter into orbit at an altitude of 1,000 miles. It is hoped the experiment will show that two-way radio communications can be established, across the country and possibly with other continents, by bouncing signals off the sphere.

In the offing are more ambitious projects intended to make it possible to establish a global television network and radio and teletype channels connecting any points on earth. Projects like these await superior rockets. Use of outer space for peaceful communications purposes would depend in most cases on orbiting of satellites at a distance of 22,000 miles from the earth. At this great altitude, a satellite would complete an orbit in exactly 24 hours and thus, if moving in the same direction that the earth rotates, maintain a fixed position in relation to given points on the earth. Three such satellites placed equidistantly around the equator could provide Russia or the United States with more than 100 voice channels and several thousand teletype channels. The United States, and probably Russia, do not yet possess the upper-stage rocket capacity to perform this feat with precision. This country lacks also the necessary first-stage power.

NASA's Plans for Developing Space Vehicles

The most important of NASA's efforts—from the point of view of duplicating or surpassing Soviet achievements and of moving ahead with plans for manned satellites and space exploration—is what it calls the National Space Vehicle Program. About 25 per cent of the agency's appropriation for fiscal 1960 is devoted to developing and producing more powerful and reliable multi-purpose rockets.[15]

Spending for propulsion is bound to increase appreciably in the next two or three years—whether or not space competition with the Soviets is given higher priority. The Pentagon has footed the bill for Project Saturn up to now; NASA will soon have to do so. All of the booster rockets

[15] Forty to 45 per cent of the 1960 budget—what remains after the amounts set aside for Project Mercury, development of instruments for exploration, and the Space Vehicle Program—has been allocated to building research facilities, setting up a world-wide tracking network, and financing research and development by government agencies and private companies.

except Vanguard's were supplied by the military; now NASA will have to pay for development of the many rocket combinations which employ a booster developed by the Defense Department as a first stage.

It is difficult to give an exact count of the space vehicle programs under way at NASA. Glennan said of the space program on Oct. 28: "This is the most fluid of businesses, subject to constant and continuing review and evaluation in light of fast-breaking developments." Space vehicles currently occupying NASA's attention include, in probable order of when they will be operational, Thor-Delta, Scout, Vega, Centaur, Saturn, and Nova. Of these six, Vega, Centaur, and Saturn are of special importance at this time.

Scout and Thor-Delta, though important vehicles that are to be employed in 1960, do not possess the thrust necessary to match past Soviet achievements. The former, a relatively inexpensive four-stage system which can launch a 250-pound payload into a 300-mile orbit, will be valuable as an all-purpose research vehicle. The latter, an assembly based on the Thor intermediate range ballistic missile, can be used to launch 1,000 pounds into a 300-mile orbit or a 60-pound payload into a lunar orbit.

Nova, with a take-off thrust of 6,000,000 pounds (almost 10 times the thrust of the Soviet booster), will be powerful enough to compare with the vehicles of science fiction. It will be able to launch a 150,000-pound payload into a 300-mile orbit or to place a load of 20,000 pounds on the moon or of 4,500 pounds on Venus. This giant space craft, however, is in the very early stages of research and development and may not be operational until a decade from now.

Glennan said on Oct. 28: "As the situation stands now, it is reasonably certain that in early 1961 the Vega will be the first of our space vehicle systems capable of matching the performance demonstrated by the Russians more than a year ago." He explained that "In its three-stage version, which should be ready for initial flight early in 1961, Vega will place 4,800 pounds in a 300-mile orbit."

Vega, like Centaur which will be ready six months to a year later, will employ the Atlas as a first-stage booster. While the 390,000 pounds of take-off thrust that will be given both vehicles is considerably less than that of which

the Soviet booster is capable, upper stages will make up the difference. Indeed, Centaur's upper stages, the first to use liquid hydrogen as a fuel, will give that vehicle almost twice Vega's payload capabilities. Centaur will be able to launch 8,000 pounds into a 300-mile orbit or 2,300 pounds into a deep space trajectory to the moon or beyond. Glennan implied that use of liquid hydrogen in space involved considerable risk but said that "We have high hopes for this system and might well use it as a replacement for the Vega if it proves satisfactory."

Saturn, a mighty cluster of eight engines capable of 1.5 million pounds of thrust, is in some ways the most interesting space project planned for the near future. Twice as powerful in take-off as Russia's biggest booster, Saturn could be used to put three communications satellites into equidistant orbit at a 22,000-mile altitude, lift manned space stations into orbit, loft 30,000 pounds into a 300-mile orbit, or land 20,000 pounds on the moon.

Inevitability of Civilian-Military Overlapping

With the shift of Saturn to NASA, some of the confusion attending the bounds of civilian and military authority in space was cleared up. It became plain that NASA was to have full control over development of all future rocket boosters and upper-stage rockets required to put sizable payloads far into space. When and if there are defense needs for giant boosters, NASA will provide them for the military—just as the military has provided most of the smaller boosters for NASA's initial space projects.

In the lower reaches of outer space, however, there is still considerable civilian-military overlap. By rule of thumb, present military requirements end at an altitude of about 600 miles. The military booster mission was assigned this year to the Air Force, thus reducing interservice rivalry on one score,[16] but at altitudes up to about 600 miles, NASA and the Pentagon are carrying on similar programs.

The Air Force's Project Dyna-Soar, now in the late study stage, resembles NASA's Project Mercury in that both aim to put a man into orbit. More sophisticated than Mercury, Dyna-Soar will be a maneuverable space craft. The Army's Project Notus, an "active" communications satellite that

[16] If the Army or Navy has a satellite to launch, the Air Force will do the job.

will carry sending and receiving apparatus, is more advanced than the "passive" communications projects NASA has under consideration; in those projects radio waves will be bounced against the vehicle. The Air Force's Project Samos incorporates "seeing-eye" features similar to NASA's weather satellite; it is intended for reconnaissance use to relay information on the military movements and installations of an enemy.

Both civilian and military space officials have stressed the point that some degree of overlap is inevitable. Glennan pointed out last May 7 that "Vehicles designed for peaceful exploration of space can also be used for military operations—just as airplanes and automobiles can be used for military purposes." Roy W. Johnson, director of the Advanced Research Projects Agency, told a Senate subcommittee last spring: "I believe that once this pioneering stage is over with, the civilian and military programs will diverge markedly and we will be using different vehicles, different hardware."

Strengthening of U.S. Space Policy

IT SEEMS LIKELY that the position of the United States in space vis-a-vis the Soviet Union will get worse before it gets better. Until the Vega is ready for use in 1961, and Centaur and Saturn after it, NASA will have to rely on three classes of rockets—old standbys like Juno II, newer but not very powerful vehicles scheduled for use in 1960 like Thor-Delta and Scout, and powerful makeshift vehicles like the Atlas-Able. The Atlas-Able, whose upper stages are not ideally mated to its first stage, is the most powerful vehicle NASA can assemble at present, but its reliability has yet to be established.[17] In the meantime, Russia can be expected to use its powerful and reliable booster to mark up new "firsts."

Proposals to Tighten Organizational Setup

Efforts to unify civilian and military space programs may be pressed at the coming session of Congress. The

[17] One Atlas-Able, scheduled to put a 372-pound camera-carrying satellite into lunar orbit when the moon veered into good range of the earth in October, blew up on the launching pad during a static test on Sept. 24. A second, with a like mission, was the one launched on Nov. 26 that failed to reach orbital velocity. NASA has no other Atlas-Able immediately available.

transfer of Saturn to NASA brought varying comment. C. Paul Means, associate editor of *Missiles and Rockets*, wrote on Nov. 9: "The National Aeronautics and Space Administration, after two years of in-fighting which saw as many as five cooks in the space kitchen—each with its own recipe—has now emerged as the one agency responsible for U.S. space prowess." On the other hand, *Business Week* observed on Oct. 31 that "Congressional efforts to bolster the space program will center on the question of stronger central control."

Sens. Johnson and Symington and other members of Congress have shown increasing dissatisfaction with the fact that the military and civilian ends of the program are directed independently of each other. The office of William M. Holaday, chairman of the Civilian-Military Liaison Committee set up under the Space Act, serves mainly as a clearing house for space information; neither Holaday nor his committee has real power to settle differences between agencies.

Proposals to tighten space organization may well call for strengthening of the Space Council. The President was authorized by the Space Act to appoint an executive secretary and a professional staff for the top policy-making council. He has done neither, although the Senate Subcommittee on Governmental Organization for Space Activities, in a report published on Aug. 25, unanimously recommended that these positions be filled.[18] The President has convened the council only seven times in the past year.

It has been suggested that Congress may try to force appointment of an executive secretary of the Space Council and arm him with clear-cut authority as top man in the overall space effort. A more extreme, longer-range plan that has some support calls for removal of military space projects from the Pentagon, save for liaison arrangements.[19]

Debate Over the Budget for Space Projects

Hanson W. Baldwin, *New York Times* military analyst, wrote on Oct. 29: "There are two fundamental factors that govern our space accomplishments far more than de-

[18] The subcommittee, headed by Sen. Symington, said the Space Act had not "been fully tested" and that problems of duplication and waste could be dealt with administratively.

[19] *Business Week* said of this approach, Oct. 31: "In effect NASA would be for space what the Atomic Energy Commission is in the nuclear field—an arrangement that hasn't noticeably hampered military exploitation of military power."

tails of space organization. One is money. . . . The second is a lack of understanding of the political and psychological importance of space achievements." Baldwin said that both the administration and Congress were to blame for the inadequacy of the space program's budget.

Failure of Congress to fully support the program was shown by its handling of the administration's budget request for the current (1960) fiscal year. The administration, in what it called a "lean budget," had asked $530 million for the civilian space program. The House cut that amount by more than $68 million. Glennan told a Senate subcommittee, July 13, that the House action would have "disastrous consequences" if allowed to stand. The Senate voted the full amount, but the House refused to go along, and in the end NASA was given $501 million, or nearly $30 million less than the administration had sought for the agency.

The argument that the administration is to blame for an inadequate space budget is more complicated but more significant. Basically, it rests on the view that the White House has put too much stress on economy and budget-balancing and has failed to recognize the importance of exploring space for peaceful purposes. Administration spokesmen concede that space explorers are not getting all they want, but they insist that military missile needs must come ahead of civilian space demands.

The Saturn rocket is a case in point. This powerful vehicle, when operational, will be the first to have more take-off thrust than the present Russian booster. However, because it will be more powerful than a long-range missile needs to be to carry a nuclear warhead deep into the Soviet Union, the Pentagon gave the project less than top priority. The Army Ballistic Missile Agency requested $135 million for Saturn in fiscal 1960 but received only $70 million.

When the project was still under Pentagon control, spending for it was to be increased to $140 million in fiscal 1961. The "memorandum of understanding" signed when the transfer to NASA was agreed upon specified that "Funding of the project shall be continued at current levels unless revised by agreement between the Department of Defense and NASA." *Missiles and Rockets* estimated on Nov. 2 that if the Saturn program were accelerated, it would be possible

to step up expenditures from $70 million to $130 million in the current fiscal year and to $250 million in fiscal 1961.

A week after the transfer, Roy W. Johnson, soon to retire as director of the Advanced Research Projects Agency, joined von Braun in urging that $240 million be budgeted for Saturn in fiscal 1961 in order to get the rocket ready by 1963 instead of 1965. Johnson said: "This program is going to cost $800 million, no doubt about it. We've got to make up our mind that we're going to spend it. If we are going to do it, let's get about it, not wait three years." Glennan estimated before NASA got Saturn, that the civilian space program would cost about $750 million in fiscal 1961. Depending on whether or not Saturn is speeded up, NASA will now need $900 million or $1 billion.

The Wall Street Journal reported, Nov. 18, that Huntsville scientists were of opinion that raising Saturn spending to $240 million next year "would mean shaving about $50 million from the final bill," inasmuch as "a big bundle of money" now would allow them "to buy rocket hardware in quantity." Space scientists and engineers point out that larger appropriations would go for an increased number of duplicate parts, more machines and men to test those parts, and more test rockets. These things are seen to have real significance, they say, when it is recalled that delays often have occurred because a supply of carefully tooled parts ran out; some launchings have gone wrong from failure of a tiny "$10 gadget" that might have been better tested had more money been on hand.

Need to Promote Understanding of Space Race

Underlying this country's failure to narrow the Soviet lead in space competition, a growing number of observers believe, is the fact that Americans are not yet psychologically prepared to accept the fact that exploration of space will impose heavy financial burdens and in all probability involve loss of human lives. Donald M. Michael, a psychologist who has studied public attitudes toward space, said on Sept. 5 that when a huge new rocket combination costing many millions of dollars stands poised for initial take-off, "Somehow the people have to become reconciled to the fact that in all likelihood they're going to lose every penny they've invested." Unless the value and the necessity of conquering space are understood, he said, public reaction

to the death of one or more Project Mercury astronauts might set the country's progress in space back for years.

Bipartisan public support for an accelerated space program will be hard to gain, it is agreed, unless a stop is put to efforts to make political capital out of past failures or shortcomings. *Business Week* observed on Oct. 31 that "One reason for the current state of our space effort is that neither the Democrats nor the Republicans have a crystal-clear record on space." The Soviet Union began an intensive program of missile and rocket development at the close of World War II. The Truman administration did relatively little in the field, concentrating instead on strengthening a Strategic Air Command armed with atomic weapons. The Eisenhower administration followed the same course until about 1954, and it was not until late 1957 that it began to realize that peaceful space victories might be of great consequence in the cold war.

Maj. Gen. John B. Medaris said early in November: "The first thing this country has to do is make up its mind whether it is in a space race with Russia or not. It is my personal opinion that we are stupid if we don't make a race of it." *The Wall Street Journal*, after interviewing military and civilian space scientists, Pentagon leaders, and executives of companies engaged in space work, reported on Nov. 5 that "The experts agree pretty much on the broad outlines of a program." The composite opinion was that President Eisenhower, then Congress and the public, must be sold on the idea that the United States "should compete vigorously with the Russians instead of just paying 'lip service' to the idea of a space contest."

Life magazine observed in a full-page editorial, Nov. 30, that the most basic of the reasons why the United States continues to lag behind the Soviets is that "Space has no real friends at the top." *Life* said that "Whatever money we vote will be wasted unless the President makes the big decision that the U.S. is serious about the space race." Once this happens, it is widely asserted, the way will be clear to simplify the organizational maze which now hinders decision-making, to curb the constant reappraisal and reshuffling of space projects, and to put forth the effort and money required to build a large rocket engine with utmost expedition—and enough rockets to perform a variety of missions.

Francis Bello wrote in *Fortune* last summer: "The Space Age will test the ability of two very different societies [American and Soviet] to mobilize their industrial skills, to draw up long-range plans, to make complex decisions, to educate for the tremendous scientific challenges ahead, and to create congenial environments for some of their most creative minds." [20] Leo Steg, a scientist in General Electric's missile and space vehicle department, said recently that the major reason why the United States is about five years behind the Russians is because the Russians have been alert to "the global public relations potential" of the space race. Steg thinks this prestige angle has become more important with the development of an arms stalemate, in both missiles and nuclear weapons, that makes it impossible for either the United States or the Soviet Union to impress the world's peoples through military predominance.

Meanwhile, hope persists that international competition in space will give way to a substantial measure of cooperation, once the balance between the two leaders has become more nearly even. T. Keith Glennan pointed out at Pasadena, Dec. 7, that it was "obviously desirable that national programs in the space field be coordinated to avoid undesired duplication and to provide the enhanced increase in knowledge that comes from coordinated efforts."

Glennan said he looked forward to coordination of basic research in space through the Committee on Space Research. COSPAR, created in October 1958 to continue cooperation in space research initiated during the International Geophysical Year, failed at first to win the support of Soviet scientists. But recently proposed organizational changes give promise of assuring Russian representation in the future work of the committee.

[20] Francis Bello, "The Early Space Age," *Fortune*, July 1959, p. 84.